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PATENT  
Attorney Docket No. 026549-000100US  
Client Ref. No. 30836

TOWNSEND and TOWNSEND and CREW LLP

By: 

Jo Ann Honcik Dallara

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:

Ronit Eisenberg  
Raz Tamar

Application No.: 10/009,809

Filed: April 26, 2002

For: CELL PENETRATING ANTI-  
ALLERGIC PEPTIDES

Customer No. 20350

Confirmation No. 1519

Examiner: Crowder, Chun

Technology Center/Art Unit: 1644

SUBSTITUTE APPELLANTS' BRIEF  
UNDER 37 CFR §41.37

Mail Stop Appeal Brief  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Further to the Notification of Non-Compliant Appeal Brief mailed on August 26, 2008, for the above-referenced application, Appellants submit this Substitute Brief on Appeal. Appellants believe no additional fees are required. Should additional fees be required, the Commissioner is authorized to charge the undersigned's Deposit Acct. No. 20-1430.

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### **1. REAL PARTY IN INTEREST**

The real parties in interest are the two co-assignees: Ramat at Tel-Aviv University LTD. and Allergene LTD of Israel.

### **2. RELATED APPEALS AND INTERFERENCES**

There are no related appeals, interferences, or judicial proceedings at this time.

To fully comply with requirements recently set forth under *McKesson Information Solutions Inc. v. Bridge Medical Inc.*, 487 F.3d 897 (Fed. Cir.2007), appellants identify U.S. Pat. No. 7,112,568, which is based upon a later filed application and provisos out the subject matter of this invention. In addition, USSN 11/495,625 and USSN 11/214,588 have claims that overlap with the claims on appeal. In compliance with *McKesson*, appellants will address conflicting positions taken by the examiners by informing the examiners as appropriate.

### **3. STATUS OF CLAIMS**

Claims 63-70 and 72-78 are pending. All the other claims, 1-62, 71, and 78-79 have been canceled. Claims 63-70 and 72-78 are rejected as obvious and are being appealed.

### **4. STATUS OF AMENDMENTS**

The last amendment to the claims was the cancellation of claim 79 in the Amendment filed on October 22, 2007. The Examiner entered the Amendment in the final Office Action mailed on November 29, 2007. No further amendments have been entered.

### **5. SUMMARY OF CLAIMED SUBJECT MATTER**

The pending claims are not separately appealed. There are two independent claims 63 and 74. This invention provides for an anti-allergy agent comprising a cell penetrating peptide [CPP] from Kaposi fibroblast growth factor [KFGF] fused to either of two specific inhibitors of mast cell activation,  $G\alpha_i3$  or  $G\alpha_t$ . Claim 74 recites both inhibitors. Claim 63 recites only  $G\alpha_i3$  (Seq ID No. 1).

CLAIM 63 - INDEPENDENT

Claim 63 finds support from: (i) original claim 30 (general use language) *at page 33, lines 19-24*; (ii) original claims 42 and 43 *at page 34, lines 15-20* reciting the two inhibitors G $\alpha$ t or G $\alpha$ i<sub>3</sub>; and, (iii) original claim 43 *at page 34, lines 17-18* reciting the KFGF CPP. Support for the sequences of the two inhibitors is found on *page 10 at lines 6-17*. The KFGF CPP sequence finds support in the same table on *page 10 at lines 6-17*.

CLAIM 74 - INDEPENDENT

Claim 74 finds support from: (i) original claim 30 (general use language) *at page 33, lines 19-24*; (ii) original claims 42 and 43 reciting the two inhibitors G $\alpha$ t or G $\alpha$ i<sub>3</sub> *at page 34, lines 15-20*; and, (iii) original claim 43 reciting the KFGF CPP *at page 34, lines 17-18*. Support for the sequences of the two inhibitors is found on *page 10 at lines 6-17*. The KFGF CPP sequence finds support in the same table on *page 10*.

THE INVENTION:

This invention provides for an anti-allergy agent comprising a cell penetrating peptide [CPP] from Kaposi fibroblast growth factor fused to either of two specific inhibitors of mast cell activation, G $\alpha$ t or G $\alpha$ i<sub>3</sub>. In a test of four different CPPs, the claimed CPP from Kaposi fibroblast growth factor [Seq ID No. 3] was surprisingly discovered to be the *only* CPP able to transport the two inhibitor domains [Seq ID Nos. 1 and 2] in a manner that **inhibited** mast cell activation.

Independent claim 74 is illustrative:

74. A method of inhibiting mast cell degranulation in a subject, the method comprising administering to the subject a pharmaceutically effective amount of a therapeutic agent, wherein said therapeutic agent comprises a complex molecule which comprises a peptide having a first segment having an amino acid sequence AAVALLPAVLLALLAP (SEQ ID NO:3) and a second segment having an amino acid sequence KENLKDCGLF (SEQ ID NO:2) or KNNLKECGLY (SEQ ID NO:1), said first segment being joined to ----  
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said second segment through a linker, thereby inhibiting mast cell degranulation in the subject.

## TECHNICAL OVERVIEW:

This invention provides for a novel anti-allergy agent. The agent works by inhibiting the release of histamines by mast cells (degranulation). Mast cell degranulation or secretion are at the heart of many serious allergies.

The claimed agents are a fusion of a cell penetrating peptide [CPP] with one of two different mast cell inhibitors. Cell penetrating peptides are a known class of peptides that can transport themselves across a cell membrane into the cytosol of a cell. The prior art teaches that CPPs can be fused to biologically active proteins and will facilitate their delivery into cells.

In the subject invention, the two mast cell inhibitors are in the prior art. They are designated G $\alpha$ i<sub>3</sub> and G $\alpha$ t and are 9 and 10 amino acids long, respectively.

While cell penetrating peptides are known, the technology is not well understood. Both Examiners Nolan and Crowder acknowledged the field as unpredictable. Examiner Nolan wrote in the non-final Office Action of April 8, 2005, on page 4:

Claims 44, 52-62 [are -sic] rejected under 35 U.S.C. §112, first paragraph, because the specification while being enabling for using the importation peptide AAVALLPAVLLALLAP, does not reasonably provide enablement for the use of any importation molecule to treat allergies. ... Since applicant's working examples demonstrate unpredictability in the ability of the import peptide to successfully transfer the inhibitory degranulation peptide to mast cells in vitro it would require an undue amount of experimentation to practice the full scope of the claimed invention in vivo.

Examiner Crowder wrote on page 4 of the non-final Office Action mailed August 2, 2006:

Claims 63-70, 72-74 and 77-80 are rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement ... The state of the art recognizes that the effect of cell-penetrating peptides can be unpredictable due to limited knowledge of the mechanisms associated with mast cell exocytosis.

## **6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

A. The Examiner rejects the pending claims 63, 66-79 and 72-79 as obvious (35 U.S.C. §103) over Holgate *et al.* (British Med. Bull. 1992, 481:40-50) in view of Aridor, (Science, 1993, 262:1569-1572) and Lin (U.S. Pat. No. 5,807,746). Holgate is relied upon as generally teaching that pharmacological agents can inhibit mast cell degranulation and these agents are useful for treating diseases such as asthma. Aridor teaches Seq. No. 1 (KNNLKECGLY) and Seq. No. 2 (KENLKDCGLF). Lin teaches, Seq. ID No. 3, the Kaposi Fibroblast Growth Factor CPP (AAVALLPAVLLALLAP).

Dependent claims 64 and 65 reciting specific modifications are rejected as obvious over Holgate in view of Aridor and Lin in view of Avruch and Jackson. Avruch and Jackson recite modifications analogous to the those of dependent claims 64 and 65.

The Examiner presents the *prima facie* case of obviousness by arguing that she has identified the salient elements of the claims, a motivation to combine the elements, and a reasonable expectation that once combined, the recited elements would function to inhibit histamine release by mast cells. Appellants request that claims 64 and 65 be considered jointly with the independent claims.

B. There is a provisional double patenting rejection under 35 U.S.C. §101. The Examiner provisionally rejected the pending claims 63, 66-79 and 72-79 over co-pending applications 10/465,826 (now U.S. Pat. No. 7,112,568), and 11/214,588. Applicants do not dispute the propriety of this rejection. Responsive to the Notice of Non-compliance, a Terminal Disclaimer has been filed on September 25, 2008 to overcome the rejection over the '568 patent. With regard to the remaining provisional double patenting rejection, an appropriate Terminal Disclaimer will be filed when the first of the two applications issues as a patent.

## **7. ARGUMENT**

Appellants submit that the *prima facie* case of obviousness is not properly set forth. The Examiner's presumption that the art is sufficiently predictable to provide one of skill with a reasonable expectation of success is wrong. In contrast to the Examiner's unsupported position, experimental evidence clearly indicates that most fusions of CPP with mast cell inhibitors do not

inhibit mast cell degranulation. Alternatively, appellants seek to traverse the *prima facie* case of obviousness by surprising results. The fact that only one of the four CPPs tested successfully delivered a biologically active inhibitor was a surprise.

More specifically, appellants urge that the ability of CPPs to successfully deliver a *specific* biological agent needs to be empirically determined. The appellants' own work and the published work of others clearly demonstrated that only the claimed CPP [KFGF] fusion peptides inhibit mast cell secretion. The other three CPPs tested did not work to inhibit mast cell degranulation.

The following table provides a summary of the experimental results. The first six fusions were reported in the subject application, and the last fusion was reported in the academic literature:

CHIMERIC PEPTIDE			RESULTS
Hu Int	G $\alpha$ i <sub>3</sub>	SEQ ID NO: 6	No inhibition of histamine secretion
KFGF	G $\alpha$ i <sub>3</sub>	SEQ ID NO: 7	<b>Inhibited histamine secretion</b>
Dros	G $\alpha$ i <sub>3</sub>	SEQ ID NO: 10	Induced histamine secretion
Hu Int	G $\alpha$ t	SEQ ID NO: 11	No inhibition of histamine secretion
KFGF SEQ ID NO: 3	G $\alpha$ t	SEQ ID NO: 12	<b>Inhibited histamine secretion</b>
Dros	G $\alpha$ t	SEQ ID NO: 13	Induced histamine secretion
TP-10	G $\alpha$ i <sub>3</sub>	Jones <i>et al.</i>	Induced histamine secretion

Two Rule 132 declarations were submitted to support this conclusion. The first declarant is Dr. Ehud Razin. He is a non-inventor, a professor of Biochemistry at Hebrew-University, and an expert in mast cells. The second declarant is Dr. Ronit Eisenberg. Dr. Eisenberg is a co-inventor and professor at Tel Aviv University.

By argument and two Rule 132 Declarations, appellants explained that the unpredictability of the two mast cell inhibitor peptides to inhibit mast cell secretion once fused to a CPP arises from a variety of unpredictable factors. It was explained that once CPP penetration has occurred, the biological effect of the mast cell inhibitor cargo peptide on the mast cell can be influenced by: (i) conformation changes associated with the fusion; (ii) degradation of the “foreign” peptide in the cell; (iii) sequestering of the fusion peptide in an endosome; or, (iv) ability of the CPP to trigger mast cell release.

The Examiner expressly ignored the experimental data and the two Rule 132 Declarations explaining in scientifically object terms why the biological effect of any specific CPP is unpredictable.

The Examiner argues that she is entitled to focus entirely on the teachings of Lin, disclosing the Kaposis' CPP (AAVALLPAVLLALLAP), and ignore the negative results from the other three CPPs. In effect, she renders the *prima facie* case of obviousness irrebuttable. She writes on page 4 of the Final Office Action mailed on November 29, 2007:

In this case, the data (that shows other CCP [CPP-sic] peptides fail to inhibit histamine secretion is inadequate evidence that the claimed CCP of SEQ ID NO:3 is unpredictable. Even if the field of CPP technology is unpredictable, the instant SEQ ID No.:3 has been consistently shown to be predictable in delivery of biological cargo peptides and maintaining the functions of said peptides (see Lin et al. and the Sagi-Eisenberg declaration and Razin declaration filed on June 28, 2007).

A proper *prima facie* case of obviousness is by definition rebuttable. This Board stated in *Ex parte Ohsaka*:

The flaw with this approach is that the examiner has, in practical effect, converted a rebuttable presumption into a conclusive or irrebuttal presumption of obviousness...

when *prima facie* obviousness has been established and evidence is submitted in rebuttal, the decision-maker must start over...An earlier decision should not, as it was here, be considered as set in concrete...[T]he examiner must consider all the evidence anew. 2 USPQ 2d 1461, 1462 (PTOBPA&I 1987).



The Examiner's selective focus on the Lin disclosure of the Kaposi CPP arises from no objective, scientific rationale focusing those of skill on the Kaposi CPP. More specifically, the prior art does not favor or recommend the Lin CPP over the other CPPs. There is nothing in the declarants' statement to support the Examiner's position. The two declarants state in ¶5 that prior to the appellants' work, all the CPPs were considered to be essentially equivalents. Both Declarants wrote:

Because the prior art literature would suggest to those of skill that CPPs are interchangeable, it is surprising that the choice of CPP would be critical for obtaining biological activity.

In other words, no reference says that the Lin CPP is better than the other CPPs. It was the appellants' experimental work that determined this—at least for the two mast cell inhibitors recited in the rejected claims.

This rejection reflects a serious misunderstanding of the law relating to traversing a *prima facie* case of obviousness. An examiner cannot ignore the rebuttal argument and selectively focus on references that support his/her position. *Akzo N.V. v USITC*, 1 USPQ 2d 1241(CAFC 1986). The Federal Circuit stated on page 1246:

...prior art references before the tribunal must be read as a whole and consideration must be given where the references diverge and teach away from the claimed invention.

Similarly, there is *Application of Lunsford*, 357 F.2d 385, 389-390; 148 USPQ 721, 724 (CCPA 1966). *Lunsford* tells us that if a reference is to be ignored, the Examiner must cite specific references proving that the ignored reference should be ignored. It is not sufficient to summarily disregard the reference. The CCPA stated:

All of the facts must be considered and it is not realistic within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art.

Here, the Examiner has been provided with evidence of unpredictability based on experimental evidence but has not refuted that evidence in any objective manner. The sole argument supporting the obviousness rejection is the Examiner's belief that contrary experimental evidence need not be considered and that the rejection is properly based solely on the three references identified herein. This position of *ignoring* contrary evidence is clearly improper under the law concerning obviousness rejection. That law requires examiners consider all the facts and the rejection be reviewed anew. *Application of Kuderma*, 426 F.2d 385 at 389 (CCPA 1970).

The appellants' evidence presents a classic fact pattern for traversing a *prima facie* case of obviousness. Unlike the recent, *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348 (Fed. Cir. 2007), this is not a situation of someone selecting the *best* combination from a limited group of choices (salts) all of which were known to work to some degree. Here the other choices (CPPs) *do not* work. According to the literature, any CPP should have worked; but, three of the four CPPs did not work when fused with the two mast cell inhibitors being claimed.

The evidence presented by appellants can be viewed as both rebutting and traversing the *prima facie* case of obviousness. The Board may view the contrary data as evidence of the unpredictability of the relevant art leading to a conclusion that the *prima facie* case of obviousness is incomplete. Alternatively, the Board may view the totality of the results as sufficiently surprising in view of the number of non-working embodiments that the *prima facie* case of obviousness has been traversed. Both declarants state in their concluding paragraphs:

For these reasons, I conclude without hesitation that the claimed combinations of AAVALLPAVLLALLAP with either Gwi<sub>3</sub> or Gwt to yield a functional inhibitory effect on mast cell activation in light of failure with three other CCP's [sic-CPP's] of equal status was **unpredictable, surprising** and of great value. [emphasis added]

Either analysis leads to the same result. The obviousness rejection over Holgate, in view of Aridor and Lin, should be withdrawn.

Appellants respectfully submit that the rejection is not legally proper and request reconsideration and withdrawal of this basis for rejection under §103. The other rejections are

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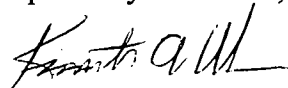
PATENT  
Atty. Docket No. 026549-000100US

dependent upon this §103 rejection. If the reviewing panel agrees with the appellants' position, the claims should be in condition for allowance.

## **8. CONCLUSION**

For these reasons, it is respectfully submitted that the rejection should be reversed.

Respectfully submitted,



Kenneth A. Weber  
Reg. No. 31,677

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61350358 v3

## **9. CLAIMS APPENDIX**

Claims 1-62 (cancelled).

63. (Previously presented) A method of inhibiting mast cell degranulation in a subject, the method comprising administering to the subject a pharmaceutically effective amount of a therapeutic agent, wherein said therapeutic agent comprises a complex molecule which comprises a first segment having an amino acid sequence AAVALLPAVLLALLAP (SEQ ID NO: 3) linked via a linker to a second segment having an amino acid sequence KNNLKECGLY (SEQ ID NO:1), thereby inhibiting mast cell degranulation in the subject.

64. (Previously presented) The method of claim 63, wherein said complex molecule is a peptide having an amino acid sequence AAVALLPAVLLALLAPKNNLKECGLY (SEQ ID NO:7) and comprises a cyclization between lysine at position 17 and the C terminus of the peptide.

65. (Previously presented) The method of claim 63, wherein said complex molecule is a peptide having an amino acid sequence AAVALLPAVLLALLAPKNNLKECGLY (SEQ ID NO:7) and comprises a succinyl residue at the N terminus of the peptide.

66. (Previously presented) The method of claim 63, wherein the mast cell degranulation is associated with a condition selected from the group consisting of nasal allergy, an allergic reaction in an eye of the subject, an allergic reactions in the skin of the subject, acute urticaria, psoriasis, psychogenic or allergic asthma, interstitial cystitis, bowel diseases, migraines, and multiple sclerosis.

67. (Previously presented) The method of claim 63, wherein the step of administration of said therapeutic agent is performed by topical administration.

68. (Previously presented) The method of claim 67, wherein said topical administration is to the eye, the skin or to a mucous membrane of the subject.

69. (Previously presented) The method of claim 63, wherein administration of said therapeutic agent is performed by inhalation or by intranasal administration.

70. (Previously presented) The method of claim 63, wherein administration of said therapeutic agent is performed by oral or systemic parenteral administration.

71. (Canceled).

72. (Previously presented) The method of claim 63, wherein said linker is a covalent bond.

73. (Previously presented) The method of claim 72, wherein said covalent bond is a peptide bond.

74. (Previously presented) A method of inhibiting mast cell degranulation in a subject, the method comprising administering to the subject a pharmaceutically effective amount of a therapeutic agent, wherein said therapeutic agent comprises a complex molecule which comprises a peptide having a first segment having an amino acid sequence AAVALLPAVLLALLAP (SEQ ID NO:3) and a second segment having an amino acid sequence KENLKDCGLF (SEQ ID NO:2) or KNNLKECGLY (SEQ ID NO:1), said first segment being joined to said second segment through a linker, thereby inhibiting mast cell degranulation in the subject.

75. (Previously presented) The method of claim 74, wherein said mast cell degranulation is IgE-dependent.

76. (Previously presented) The method of claim 74, wherein said mast cell degranulation is IgE-independent.

77. (Previously presented) The method of claim 63, wherein said mast cell degranulation is IgE-dependent.

78. (Previously presented) The method of claim 63, wherein said mast cell degranulation is IgE-independent.

79. (Canceled).

80. (Canceled).

**10. EVIDENCE APPENDIX**

**Rule 132 Declaration by Ronit Sagi-Eisenberg filed June 28, 2007, and entered in the non-final office action dated September 5, 2007.**

**Rule 132 Declaration by Ehud Razin filed June 28, 2007, and entered in the non-final office action dated September 5, 2007.**

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PATENT  
Docket No.: 026549-000100US  
Client Ref. No.: 30836

On \_\_\_\_\_

TOWNSEND and TOWNSEND and CREW LLP

By: \_\_\_\_\_

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:

Ronit Eisenberg

Patent No.:

Issued:

Application No.: 10/009,809

Filed: April 26, 2002

For: CELL PENETRATING ANTI-  
ALLERGIC PEPTIDES

Confirmation No.: 1519

Examiner: Crowder, Chun

Art Unit: 1644

RULE 132 DECLARATION

Commissioner  
P.O.  
Alexandria, VA 22313-1450

for  
Box

Patents  
1450

Sir:

I, Dr. Ronit Sagi-Eisenberg, being duly warned that willful false statements and the like are punishable by fine or imprisonment or both, under 18 U.S.C. § 1001, and may jeopardize the validity of the patent application or any patent issuing thereon, state and declare as follows:

1. All statements herein made of my own knowledge are true and statements made on information or belief are believed to be true. **The Exhibits (1 and \_ attached hereto are incorporated herein by reference.**



2. I received a Ph.D. in Biochemistry from the University of Tel Aviv in 1980.

A copy of my curriculum vitae is attached as Exhibit 1.

3. I am presently employed at Tel Aviv University and am primarily responsible for teaching and research.

4. I have read and am familiar with the contents of the application. I understand that the Examiner has a single rejection based on obviousness that is based on a combination of three references. The references are Holgate as a primary reference in view of Aridor and Lin. Holgate is cited as disclosing that agents that inhibit mast cell degranulation are recognized for treatment of diseases such as asthma. Aridor discloses KNNLKECGLY which is a mast cell activation inhibitor designated Gαi3 C-terminal peptide. Lin discloses the preferred cell penetrating peptide from Kaposi fibroblast growth factor [KFGF].

5. This invention is the surprising discovery that of four different cell penetrating peptides (CCP) only one CCP was able to successfully deliver two mast cell activation inhibitors in a biologically active manner. Because the prior art literature would suggest to those of skill that CCPs are interchangeable, it is surprising that the choice of CCP would be critical for obtaining biological activity. Accordingly, we have to conclude that the field of using cell penetrating peptides to deliver biologically active proteins is far less predictable than the Examiner believes it to be and that the applicants' results as embodied in the pending claims are both surprising and advantageous.

The following statements provide objective, scientific reasons for the above conclusion.

6. It is my understanding that the rejection of the pending claims is based on the proposition that Lin's teaching of the CCP, (AAVALLPAVLLALLAP) as a tool for delivery of biologically active cargo peptides renders the claimed combinations of AAVALLPAVLLALLAP in reading frame fusions with Gai<sub>3</sub> or Gαt C-terminal peptides obvious and unpatentable. In brief, the Examiner believes that upon reading the three references, one of skill would be motivated by Holgate to combine the KFGF CCP of Lin with the mast cell activation inhibitor of Aridor, Gai<sub>3</sub>, with a reasonable expectation that the combination would inhibit mast cell activation.

It is also my understanding that evidence of unpredictability or surprising results can legally refute this conclusion and lead to the rejection being withdrawn.

It is my further opinion that both unpredictability and surprising results have been demonstrated by the applicants' work and by the literature already of record.

7. More specifically, we know that of the four CCPs tested only one CCP was able to deliver the two mast cell activation inhibitors, Gai<sub>3</sub> or Gαt, as a biologically active inhibitors. The table below summarizes Applicants' results as described in the specification and in the Jones et al. publication.

CHIMERIC PEPTIDE RESULTS

Hu Int	Gai <sub>3</sub>	SEQ ID NO: 6	No inhibition of histamine secretion
KFGF	Gai <sub>3</sub>	SEQ ID NO: 7	Inhibited histamine secretion
Dros	Gai <sub>3</sub>	SEQ ID NO: 10	Induced histamine

			secretion
Hu Int	Gat	SEQ ID NO: 11	No inhibition of histamine secretion
KFGF SEQ ID NO: 3	Gat	SEQ ID NO: 12	Inhibited histamine secretion
Dros	Gat	SEQ ID NO: 13	Induced histamine secretion
TP-10	Gai <sub>3</sub>	Jones <i>et al.</i>	No inhibition of beta-hexoseaminidase secretion

8. From this data, it is clear that only Lin's CCP, KFGF is able to both deliver mast cell activation inhibitors and maintain their biological activity as inhibitors of mast cell activation . The Examiner says that this is predictable from the literature. I respectfully disagree.

Lin discloses that KFGF sequence transported two biologically active cargo peptides and generally states that KFGF can be used to transport other peptides. But similar reports exist for each of the other CCPs tested by applicants. The Hawiger review article discloses that the CCP designated integrin  $\beta_3$  is just as able as KFGF to transport functional peptides into a cell (see page 189, 2nd column). Finally Derossi *et al.* describes the *Drosophila* CCP as successfully delivering biologically active compounds inside live cells (page 18188, 2nd col).

From page 7 of the Office Action, the Examiner appears to interpret this literature as leading one of skill to believe that there is a reasonable expectation that any

combination of CCP with any biologically active peptide will lead to the observation of biological activity in a cell.

I respectfully disagree. There are several scientific and objective reasons why fusing a CCP to a biologically active peptide might not result in observation of expected biological activity. These reasons include improper folding of the fusion peptide resulting in conformational changes that render the cargo peptide inactive; the degradation of the foreign peptide; sequestering of the peptide in endosomes or the ability of the CCP sequence to trigger a biological response, such as mast cell degranulation (e.g. positively charged CCP might function as basic secretagogues of mast cells).

Indeed, this appears to be the case for fusion of CCP with either Gai<sub>3</sub> or Gat. The data from applicants' laboratory and from the Jones *et al.* group demonstrate that not any CCP can maintain the biological activity of Gai<sub>3</sub> or Gat. Of four CCPs, only KFGF was the only CCP able to both internalize and maintain the inhibitory activity of both Gai<sub>3</sub> and Gat. Thus the combination provides a surprisingly advantageous result that was not predictable from the prior art.

I do note the Examiner's statement on page 7 that the table on page 9 with reference to the prior literature describing the various CCPs fail to demonstrate that Lin's CCP is unpredictable as a delivery tool. While this is true, there was no academic reason *a priori* to believe that any of the other CCPs would fail to deliver Gai<sub>3</sub> and Gat while maintaining its expected biological activity. But the evidence established by the record indicates that this is not true. There is obviously something special about the two mast cell activation inhibitors or with Lin's CCP that makes the claimed combination functional compared to the other three CCPs.

Ronit Eisenberg  
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For these reasons, I conclude without hesitation that the claimed combinations of AAVALLPAVLLALLAP with either Gai<sub>3</sub> or Gat to yield a functional inhibitory effect on mast cell activation in light of failure with three other CCPs of equal status was unpredictable, surprising and of great value.

This Declarant has nothing further to say.

Dated: May 6 2007

Dr. Ronit Sagi-Eisenberg  
*Ronit Sagi-Eisenberg*

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<b>NO. OF CHILDREN</b>	status	children

## **A. EDUCATION**

<b>PERIOD OF STUDY (DATES)</b>	
<b>1970 - 1973</b>	<b>Tel Aviv University, Tel Aviv, Israel</b> <b>Chemistry</b> (Subject) <b>B.Sc.</b> (Degree) <b>1974</b> (Date Awarded)
<b>1974 - 1975</b>	<b>Tel Aviv University, Tel Aviv, Israel</b> <b>Biochemistry</b> (Subject) <b>M.Sc. studies-upgraded to Ph.D.</b>
<b>1975-1980</b>	<b>Tel Aviv University, Tel Aviv, Israel</b> <b>Bioenergetics</b> (Subject) <b>Ph.D.</b> (Degree)
<b>Title of Doctoral Dissertation</b>	Kinetic and energetic aspects of the Q cycle model.
<b>Names of Supervisors</b>	Name <b>Menachem Gutman</b> Title <b>Professor Emeritus</b>

<b>B. ACADEMIC AND PROFESSIONAL EXPERIENCE</b>	
<b>PERIOD (DATES)</b>	
<b>1975-1980</b>	<b>Tel Aviv University, Tel Aviv, Israel</b> <b>Chemistry</b> (Subject) <b>Biochemistry</b> (Department) <b>Teaching Assistant</b> (Rank/Function)
<b>1980-1984</b>	<b>The Weizmann Institute of Science, Rehovot, Israel.</b> <b>Mast cell biology</b> (Subject) <b>Chemical Immunology</b> (Department) <b>Post Doctoral fellow at the laboratory of Prof. I. Pecht.</b> (Rank/Function)
<b>08/82-11/82</b> <b>08/83-11/83</b>	<b>University College London, London, U.K</b> <b>Mast cell biology</b> (Subject) <b>Pharmacology</b> (Department) <b>Honorary Research Assistant at the laboratory of Prof. J. Foreman.</b> (Rank/Function)
<b>1984-1985</b>	<b>The Weizmann Institute of Science, Rehovot, Israel.</b> <b>Mast cell biology</b> (Subject) <b>Chemical Immunology</b> (Department) <b>Investigator</b> (Rank/Function)
<b>1985-1989</b>	<b>The Weizmann Institute of Science, Rehovot, Israel.</b> <b>Signaling mechanisms underlying mast cell exocytosis.</b> (Subject) <b>Chemical Immunology</b> (Department) <b>Senior Investigator</b> (Rank/Function)
<b>1989-1991</b>	<b>The Weizmann Institute of Science, Rehovot, Israel.</b> <b>Signaling mechanisms underlying mast cell exocytosis.</b> (Subject) <b>Chemical Immunology</b>

	(Department) <b>Associate Professor</b> (Rank/Function)
<b>1991-1994</b>	<b>National Institutes of Health, Bethesda, MD, USA</b> <b>Mast cell exocytosis.</b> (Subject) <b>Laboratory of Chemical Pharmacology</b> (Department) <b>Visiting scientist at the Laboratory of Dr. Michael Beaven</b> (Rank/Function)
<b>1994-present</b>	<b>Tel Aviv University, Tel Aviv, Israel</b> <b>The interplay between trafficking and signaling; clinical applications.</b> (Subject) <b>Cell and Developmental Biology</b> (Department) <b>Associate Professor</b> (Rank/Function)

<b>C. MEMBERSHIP IN PROFESSIONAL SOCIETIES</b>	
<b>Year</b>	<b>Society</b>
<b>1985-1991</b>	The Israel Biochemical Society
<b>1994-present</b>	The Israel Society for Cell Biology
<b>1997</b>	The American Society of General Physiologists.

<b>D. ADMINISTRATIVE DUTIES</b>	
<b>1995-1999</b>	Member of the Animal Care and Use Committee
<b>1996-1999</b>	Treasurer of the Israel Society for Cell Biology
<b>1997-2001</b>	Preclinical Advisor for the Sackler School of Medicine, New York State/American Program
<b>1998-2001</b>	Member of the Teaching Committee of the Sackler School of Medicine, New York State/American Program
<b>1998-present</b>	Member of the Research and Development Committee of the Sackler Faculty of Medicine.
<b>1998-2006</b>	Head of the Sackler Faculty of Medicine Committee for Laboratory Space
<b>1998-2006</b>	Member of the Search Committee of the Sackler Faculty of Medicine
<b>1999-present</b>	Head of Admission Committee, Graduate program, Occupational Therapy
<b>2002-present</b>	Member of the Teaching Committee of the School of Continuing Medical Education
<b>2002-2006</b>	Member of the Ph.D. students committee



<b>2002-present</b>	Member of the University Committee of Intellectual property.
<b>2005-present</b>	Head of the Dept. of Cell and Developmental Biology,
<b>2006- present</b>	Member of the Sackler Faculty of Medicine committee for Scholarships.
<b>2006-present</b>	Member of the Sackler Faculty of Medicine board.
<b>2006-present</b>	Head of the Dr. Miriam and Sheldon G. Adelson Graduate School of Medicine.

<b>E. FIELDS OF INTEREST</b>
Signal Transduction, Protein Traffic, Allergic and Inflammatory diseases, Cancer

## SCIENTIFIC PUBLICATIONS

### A. ORIGINAL ARTICLES

#### A.1 Articles Published

1. **Sagi-Eisenberg, R.** and Gutman, M.  
"Generation of high  $\Delta\Psi$  in Respiring Submitochondrial Particles by Steady-State Accumulation of Oxidized N,N,N',N' - Tetramethyl-p-phenylenediamine".  
*Eur. J. Biochem.* **97**, 127-132 (1979).
2. **Sagi-Eisenberg, R.** and Gutman, M.  
"Rate Limiting Step in Oxidation of Physiological and Artificial Reductants by Azotobacter Vinelandii Membrane Vesicles".  
*Arch. Biochem. Biophys.* **197**, 470-476 (1979).
3. **Sagi-Eisenberg, R.**, Ben-Neriah, Z., Pecht I., Terry S. and Blumberg S.  
"Structure Activity Relationship in the Mast Cell Degranulating Capacity of Neurotensin Fragments".  
*Neuropharmacology* **22**, 197-201 (1983).
4. **Sagi-Eisenberg, R.** and Pecht, I.  
"Membrane Potential Changes During IgE-Mediated Histamine Release from Rat Basophilic Leukemia Cells (RBL)".  
*J. Memb. Biol.* **75**, 97-104 (1983).
5. **Sagi-Eisenberg R.**, Geller-Bernstein C., Ben-Neriah Z. and Pecht I.  
"Direct Measurement of the Dextran-Dependent Calcium Uptake by Rat Peritoneal Mast Cells".  
*FEBS Lett.* **161**, 37-40 (1983).
6. **Sagi-Eisenberg, R.** and Pecht, I.  
"Resolution of Cellular Compartments Involved in Membrane Potential Changes Accompanying IgE-Mediated Degranulation of Rat Basophilic Leukemia Cells".  
*EMBO J.* **3**, 497-500 (1984).
7. **Sagi-Eisenberg, R.** and Foreman, J.C.  
"Fractionation of Mast Cell Components for studies of Ligand-Receptor Binding at the Plasma Membrane".  
*Immunol. Lett.* **8**, 43-47 (1984).
8. **Sagi-Eisenberg, R.** and Pecht, I.  
"Protein Kinase C, a Coupling Element between Stimulus and Secretion in Basophils".  
*Immunol. Lett.* **8**, 237-241 (1984).
9. **Sagi-Eisenberg, R.**, Mazurek, N. and Pecht, I.  
" $\text{Ca}^{2+}$  Fluxes and Protein Phosphorylation in Stimulus-Secretion Coupling of Basophils".  
*Molec. Immunol.* **21**, 1175-1181 (1984).
10. **Sagi-Eisenberg, R.**  
"A Possible Role for a Calcium Activated, Phospholipid Dependent Protein Kinase in the Mode of Action of the Anti-Allergic Drug Disodium Cromoglycate".  
*Trends Pharmacol. Sci.* **6**, 198-201 (1985).
11. **Sagi-Eisenberg, R.**, Lieman H. and Pecht I.

- "Protein Kinase C Regulation of the Receptor Coupled Calcium Signal in Histamine Secreting Rat Basophilic Leukemia Cells".  
*Nature* **313**, 59-60 (1985).
12. Sagi-Eisenberg, R., Foreman, J.C. and Shelly, R.  
"Histamine release induced by histone and phorbol ester from rat peritoneal mast cells".  
*Eur. J. Pharmacol.* **113**, 11-17 (1985).
13. Tarrab-Hazdai, R., Sagi-Eisenberg, R., Brenner, V. and Arnon, R.  
"Ion fluxes changes during early stages of *Schistosoma mansoni*; Evaluation of complement effect".  
*Eur. J. Biochem.* **154**, 563-568 (1986).
14. Zick, Y., Sagi-Eisenberg, R., Pines, M., Gierschik, P. and Spiegel, A.M.  
"Multi-site phosphorylation of the alpha subunit of transducin by the insulin receptor kinase and protein kinase C".  
*Proc. Natl. Acad. Sci. USA*, **83**, 9294-9297 (1986).
15. Reck, B., Sagi-Eisenberg, R. and Pecht, I.  
"Cytosolic free  $Ca^{2+}$  in mast cells and their mediators release".  
*J. Allergy Clin. Immunol.*, 164-169 (1986).
16. Sagi-Eisenberg, R., Foreman, J.C., Raval, P.J. and Cockcroft, S.  
"Protein and diacylglycerol phosphorylation in the stimulus secretion coupling of rat mast cells."  
*Immunology*, **61**, 203-206 (1987).
17. Zick, Y., Spiegel, A.M. and Sagi-Eisenberg, R.  
"Insulin-like growth factor I receptors in retinal rod outer segments".  
*J. Biol. Chem.* **262**, 10259-10264 (1987).
18. Safran, A., Sagi-Eisenberg, R., Neuman D. and Fuchs S.  
"Phosphorylation of the acetylcholine receptor by protein kinase C and identification of the phosphorylation site within the receptor d-subunit".  
*J. Biol. Chem.* **262**, 10506-10512 (1987).
19. Sagi-Eisenberg, R.  
"GTP-binding proteins as possible targets for protein kinase C action."  
*Trends Biochem. Sci.* **14**, 355-357 (1989).
20. Sagi-Eisenberg, R., Traub, L.M., Spiegel, A.M. and Zick, Y.  
"Protein kinase C mediated phosphorylation of retinal rod outer segment membrane proteins".  
*Cell. Signalling* **1**, 519-531 (1989).
21. Safran, A., Provenzano, C., Sagi-Eisenberg, R. and Fuchs, S.  
"Phosphorylation of membrane-bound acetylcholine receptor by cAMP-dependent protein kinase and protein kinase C; Characterization and subunit specificity".  
*Biochemistry* **29**, 6730-6734 (1990).
22. Gat-Yablonski, G. and Sagi-Eisenberg, R.  
"Evaluation of the role of inositol trisphosphate in IgE-dependent exocytosis".  
*Biochem. J.* **270**, 685-689 (1990).
23. Gat-Yablonski, G. and Sagi-Eisenberg, R.  
"Differential down-regulation of protein kinase C selectively affects IgE-dependent exocytosis and inositol trisphosphate formation".  
*Biochem. J.* **270**, 679-684 (1990).
24. Aridor, M., Traub, L. and Sagi-Eisenberg R.

- "Exocytosis in mast cells by basic secretagogues; Evidence for direct activation of GTP-binding proteins".  
*J. Cell Biol.* **111**, 909-917 (1990).
25. Traub, L.M., Evans, H.W. and Sagi-Eisenberg, R.  
"A novel 100 kDa protein, localized to receptor enriched endosomes, is immunologically related to the signal transducing G proteins Gt and Gi."  
*Biochem J.*, **272**, 453-458 (1990).
26. Zick, Y. and Sagi-Eisenberg, R.  
"A combination of H<sub>2</sub>O<sub>2</sub> and vanadate concomitantly stimulates protein tyrosine phosphorylation and polyphosphoinositide breakdown in different cell lines".  
*Biochemistry* **29**, 10240-10245 (1990).
27. Aridor, M. and Sagi-Eisenberg, R. "Neomycin is a potent secretagogue of mast cells that directly activates a GTP-binding protein involved in exocytosis".  
*J. Cell Biol.* **111**, 2885-2891 (1990).
28. Traub, L.M., Shai, E. and Sagi-Eisenberg, R.  
"Characterization of the interaction between p100, a novel G protein-related protein, and rat liver endosomes".  
*Biochem J.* **280**, 171-178 (1991).
29. Traub, L.M., and Sagi-Eisenberg, R.  
"Purification of p100, a protein antigenically related to the signal transducing G proteins Gt and Gi; Evidence for an adaptin like protein".  
*J. Biol. Chem.* **266**, 24642-24649 (1991).
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"Synovial protein kinase C and its apparent insensitivity to interleukin-1".  
*Eur.J. Biochem.* **209**, 81-88 (1992).
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"Activation of exocytosis by the heterotrimeric G-protein Gi3".  
*Science*. **262**, 1569-1572 (1993).
33. Hydar, A., Maeyama, K., Sagi-Eisenberg, R. and Beaven, M.A.  
"Antigen and Thapsigargin promote influx of Ca<sup>2+</sup> in rat basophilic RBL-2H3 cells by ostensibly similar mechanisms that allow filling of inositol 1,4,5-trisphosphate-sensitive and mitochondrial Ca<sup>2+</sup> stores".  
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34. Kassessinoff, T.A., Gabet, A., Beaven, M.A. and Sagi-Eisenberg, R.  
"Inositol polyphosphates regulate the membrane interactions of the endosomal p100, G-Protein-related protein".  
*Biochim. Biophys. Acta.* **1394**, 111-120 (1998).
35. Baram, D., Linial, M., Mekori, Y.A. and Sagi-Eisenberg, R.  
"Ca<sup>2+</sup>-dependent exocytosis in mast cells is regulated by the Ca<sup>2+</sup> sensor Synaptotagmin I".  
*J. Immunol. (Cutting Edge)* **161**, 5120-5123 (1998). (Immunology 12/115 IF 6.39)
36. Shefler, I., Taube, Z., Medalia, O. and Sagi-Eisenberg, R.  
"Basic secretagogues activate protein tyrosine phosphorylation and release of arachidonic acid

- in mast cells via a novel protein kinase C and phosphatidylinositol 3-kinase-dependent mechanism"  
*Eur. J. Immunol.* **28**, 3468-3478 (1998). (Immunology 16/115 IF 4.88)
37. Zussman, A., Hermuet, S. and Sagi-Eisenberg, R.  
 "Stimulation of  $\text{Ca}^{2+}$ -dependent exocytosis and arachidonic acid release in cultured mast cells (RBL-2H3) by a GTPase-deficient mutant of  $\text{Goi3}$ ."  
*Eur. J. Biochem.* **258**, 144-149 (1998). (Biochemistry 92/261 IF 3.16).
38. Shefler, I., Seger, R. and Sagi-Eisenberg, R.  
 "Gi-mediated activation of the mitogen-activated protein kinase (MAPK) pathway by the receptor mimetic basic secretagogues of connective tissue type mast cells. Bifurcation of arachidonic acid-induced release upstream of MAPK."  
*J. Pharmacol. Exp. Ther.* **289**, 1654-1661 (1999). (Pharmacology 26/193 IF 4.1)
39. Baram, D., Adachi, R., Medalia, O., Tuvim, M., Dickey, B.F., Mekori, Y.A. and Sagi-Eisenberg, R.  
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*J. Exp. Med.* **189**, 1649-1658 (1999). (Immunology 5/115 IF 13.97)
40. Zussman, A. and Sagi-Eisenberg, R.  
 "Stimulation of  $\text{Ca}^{2+}$ -dependent exocytosis and release of arachidonic acid in cultured mast cells (RBL-2H3) by quercetin; Sensitization, linked to inhibition of  $\text{Gi3}$  GTPase activity".  
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41. Shefler, I. and Sagi-Eisenberg, R.  
 "Gi-mediated activation of the syk kinase by the receptor mimetic basic secretagogues of mast cells; role in mediating arachidonic acid/metabolites release.  
*J. Immunol.* **167**, 475-481 (2001). (Immunology 12/115 IF 6.39)
42. Shefler, I. and Sagi-Eisenberg, R.  
 "Gi-mediated activation of the p42/p44 Mitogen-Activated Protein Kinases by receptor mimetic basic secretagogues is abrogated by inhibitors of endocytosis. International Immunopharmacology. **2**, 711-720 (2002). (Pharmacology 89/193 IF 2.0)
43. Baram, D., Peng, Z., Medalia, O., Mekori, Y.A. and Sagi-Eisenberg, R.  
 "Synaptotagmin II negatively regulates MHC class II presentation by mast cells". *Molecular Immunol.* **38**, 1347-1352 (2002). (immunology 19/115 IF 4.3).
44. Peng, Z., Grimberg, E. and Sagi-Eisenberg, R.  
 "Suppression of synaptotagmin II restrains phorbol ester-induced down-regulation of protein kinase  $\text{C}\alpha$  by diverting the kinase from a degradative pathway to the recycling endocytic compartment".  
*J. Cell Sci.* **115**, 3083-3092 (2002). (Cell Biology 22/153 IF 6.54)
45. Grimberg, E., Peng, Z., Hammel, I. and Sagi-Eisenberg, R.  
 "Synaptotagmin III is a critical factor for the formation of the perinuclear endocytic recycling compartment and determination of secretory granules size."  
*J. Cell Sci.* **116**, 145-154 (2003). (Cell Biology 22/153 IF 6.54)
46. Haberman, Y., Grimberg, E., Fukuda, M. and Sagi-Eisenberg, R.  
 "Synaptotagmin IX, a possible linker between the perinuclear endocytic recycling compartment and the microtubules".  
*J. Cell Sci.* **116**, 4307-4318 (2003). (Cell Biology 22/153 IF 6.54)
47. Kapp Barnea, Y., Melnikov, S., Shefler, I., Jeromin, A. and Sagi-Eisenberg, R.  
 "Neuronal Calcium Sensor-1 (NCS-1) and phosphatidylinositol 4-kinase beta regulate IgE

receptor triggered exocytosis in cultured mast cells”.

J. Immunol. **171**, 5320-5327 (2003). (Immunology 12/115 IF 6.39)

48. Atiya-Nasagi, Y., Cohen, H., Medalia, O., Fukuda, M. and Sagi-Eisenberg, R.  
“O-glycosylation is essential for intracellular targeting of synaptotagmins I and II in non-neuronal specialized secretory cells”.

J. Cell Sci. **118**, 1363-1372 (2005). (Cell Biology 22/153 IF 6.54)

49. Haberman, Y, Ziv I, Gorzalczy, Y, Fukuda, M and Sagi-Eisenberg R.  
“Classical protein kinase C(s) regulates targeting of synaptotagmin IX to the endocytic recycling compartment”.

J Cell Sci. **118**, 1641-1649. (2005). (Cell Biology 22/153 IF 6.54)

50. Kapp-Barnea, Y., Ninio-Many, L., Hirschberg, K., Fukuda, M., Jeromin, A. and Sagi-Eisenberg, R.

“Neuronal Calcium Sensor-1 (NCS-1) and PI4K $\beta$  stimulate ERK1/2 signaling by accelerating recycling through the endocytic recycling compartment (ERC).”

MBC. **17**, 4130-4141 (2006). (Cell Biology 23/153 IF 6.52)

51. Haberman, Y., Ziv, I., Gorzalczy, Y., Hirschberg, K., Mittleman, L., Fukuda, M. and Sagi-Eisenberg, R.

“Synaptotagmin (Syt) IX is an essential determinant for protein sorting to secretory granules in mast cells”.

Blood. **109**, 3385-3392 (2007). (Hematology 2/60 IF 10.13)

52. Merimsky, O., Gorzalczy, Y. and Sagi-Eisenberg, R. “Molecular impacts of rapamycin based drug combinations; Characterization of the molecular consequences of applying the mTOR inhibitor rapamycin with either gemcitabine or imatinib mesylate on human leiomyosarcoma”. Int. J. Oncology. Accepted. (Oncology 55/123 IF 3.16)

53. Shefler, I., Zavaro, O., Raz, T. Baram, D. and Sagi-Eisenberg, R.

“Inhibition of basic secretagogues-induced signaling in mast cells by cell permeable G $\alpha$ i-derived peptides.” Int. Arch. Allergy. Under revision. (Allergy 5/16 IF 2.2).

## **B. INVITED REVIEW ARTICLES IN JOURNALS**

1. Sagi-Eisenberg, R. and Pecht, I.

“The dual role of protein kinase C in the stimulus-secretion coupling of basophils”.  
Rev Clin Basic Pharm **33S**-37S (1985).

2. Aridor, M. and Sagi-Eisenberg, R.

“The role of GTP-binding proteins in the control of mast cell exocytosis”.  
Cellular and Cytokine Networks in Tissue Immunity **11**, 169-175 (1991).

3. Baram, D., Mekori, Y.A. and Sagi-Eisenberg, R.

Synaptotagmin Regulates Mast Cell Functions.  
International Arch. Allerg. Immunol **124**: 166-168 (2001).

4. Baram, D., Mekori, Y.A. and Sagi-Eisenberg, R.

“Synaptotagmin Regulates Mast Cell Functions.”  
Immunol. Reviews. **179**:25-34 (2001).

5. Sagi-Eisenberg, R.

“The Molecular Mechanisms of Allergic Diseases; IgE-Dependent and IgE-Independent Signaling Pathways Converge in Eliciting the Release of Arachidonic Acid Metabolites”.  
The Israel Medical Association Journal. **4**: 963-966 (2002).

6. **Sagi-Eisenberg, R.**

"The mast cell: where endocytosis and regulated exocytosis meet"

Immunol. Reviews. 217:292-303 (2007).

7. Fukuda, M. and Sagi-Eisenberg, R.

"Confusion in the nomenclature of synaptotagmins V and IX: which is which?"

Calcium Binding Proteins. In press.

**C. CHAPTERS IN BOOKS**

1. Pecht, I., **Sagi-Eisenberg, R.** and Mazurek, N.

"Modulation of Calcium Ions Fluxes as Signals for Mast Cells and Basophils Degranulation".

In: Mobility and Recognition in Cell Biology eds. Sund, Veeger, Walter de Gryters Co., Berlin, New York, pp. 409-426 (1983).

2. Pecht, I. and **Sagi-Eisenberg, R.**

"Calcium Channels Formation and Modulation in Secreting Basophils and Mast Cells".

In: Calcium, Neuronal Function and Transmitter Release, eds. B. Katz and R. Rahamimoff Martinus Nijhoff Publish, Boston pp. 457-471 (1984).

3. **Sagi-Eisenberg, R.**

"The role of protein kinase C in histamine secretion: Implications for the mode of action of the anti-asthmatic drug cromolyn"

In: Current Topics in Pulmonary Pharmacology and Toxicology. Hollinger, M.A. ed., pp. 24-42 (1987).

4. **Sagi-Eisenberg, R.**, Traub, L.M., Gat-Yablonski, G. and Aridor, M.

"A novel cytosolic GTP-binding protein with phospholipid stimulated GTP-binding and GTPase activities".

In: The Guanine-Nucleotide Binding Proteins; Common Structural and Functional Properties. NATOASI Series, Plenum, Vol. 165, pp. 347-355 (1989).

5. Safran, A., Provenzano, C., **Sagi-Eisenberg, R.** and Fuchs, S.

"Phosphorylation of the nicotinic acetylcholine receptor and localization of its phosphorylation sites".

In: Molecular Biology of Neuroreceptors and Ion Channels; NATO-ASI Series, Springer-Verlag, Berlin, Heidelberg, Vol. H32, pp. 373-380 (1989).

6. **Sagi-Eisenberg, R.**

"Signal Transmission Pathways in Mast Cell Exocytosis".

In: The Handbook of Immunopharmacology. Academic Press, UK. pp. 71-88 (1993).

7. **Sagi-Eisenberg, R.**

"Protein kinase C and Diacylglycerol".

In: Textbook of Receptor Pharmacology. Eds. Foreman and Johansen. CRC Press, Inc. 227-239 (1996).

8. **Sagi-Eisenberg, R.**

"Activation of heterotrimeric GTP-binding proteins.

In: Signal transduction in mast cells and basophils; Springer-Verlag. pp. 286-315 (1998).

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to:

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**PATENT**  
Docket No.: 026549-000100US  
Client Ref. No.: 30836

On \_\_\_\_\_

TOWNSEND and TOWNSEND and CREW LLP

By: \_\_\_\_\_

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:

Ronit Eisenberg

Patent No.:

Issued:

Application No.: 10/009,809

Filed: April 26, 2002

For: CELL PENETRATING ANTI-  
ALLERGIC PEPTIDES

Confirmation No.: 1519

Examiner: Crowder, Chun

Art Unit: 1644

RULE 132 DECLARATION

Commissioner  
P.O.  
Alexandria, VA 22313-1450

for  
Box

Patents  
1450

Sir:

I, Dr. Ehud Razin, being duly warned that willful false statements and the like are punishable by fine or imprisonment or both, under 18 U.S.C. § 1001, and may jeopardize the validity of the patent application or any patent issuing thereon, state and declare as follows:

1. All statements herein made of my own knowledge are true and statements made on information or belief are believed to be true. **The Exhibits (1 and \_ attached hereto are incorporated herein by reference.**



2. I received a Ph.D. in Immunology/Cell Biology from the Weizmann Institute of Science in 1980.

A copy of my curriculum vitae is attached as Exhibit 1.

3. I am presently employed at the Hebrew University of Jerusalem and am primarily responsible for teaching and research.

4. I have read and am familiar with the contents of the application. I understand that the Examiner has a single rejection based on obviousness that is based on a combination of three references. The references are Holgate as a primary reference in view of Aridor and Lin. Holgate is cited as disclosing that agents that inhibit mast cell degranulation are recognized for treatment of diseases such as asthma. Aridor discloses KNNLKECGLY which is a mast cell activation inhibitor designated Gai3 C-terminal peptide. Lin discloses the preferred cell penetrating peptide from Kaposi fibroblast growth factor [KFGF].

5. This invention is the surprising discovery that of four different cell penetrating peptides (CCP) only one CCP was able to successfully deliver two mast cell activation inhibitors in a biologically active manner. Because the prior art literature would suggest to those of skill that CCPs are interchangeable, it is surprising that the choice of CCP would be critical for obtaining biological activity. Accordingly, we have to conclude that the field of using cell penetrating peptides to deliver biologically active proteins is far less predictable than the Examiner believes it to be and that the applicants' results as embodied in the pending claims are both surprising and advantageous..

The following statements provide objective, scientific reasons for the above conclusion.

6. It is my understanding that the rejection of the pending claims is based on the proposition that Lin's teaching of the CCP, (AAVALLPAVLLALLAP) as a tool for delivery of biologically active cargo peptides renders the claimed combinations of AAVALLPAVLLALLAP in reading frame fusions with Gai<sub>3</sub> or Gat C-terminal peptides obvious and unpatentable. In brief, the Examiner believes that upon reading the three references, one of skill would be motivated by Holgate to combine the KFGF CCP of Lin with the mast cell activation inhibitor of Aridor, Gai<sub>3</sub>, with a reasonable expectation that the combination would inhibit mast cell activation.

It is also my understanding that evidence of unpredictability or surprising results can legally refute this conclusion and lead to the rejection being withdrawn.

It is my further opinion that both unpredictability and surprising results have been demonstrated by the applicants' work and by the literature already of record.

7. More specifically, we know that of the four CCPs tested only one CCP was able to deliver the two mast cell activation inhibitors, Gai<sub>3</sub> or Gat, as a biologically active inhibitors. The table below summarizes Applicants' results as described in the specification and in the Jones et al. publication.

CHIMERIC PEPTIDE			RESULTS
Hu Int	Gai <sub>3</sub>	SEQ ID NO: 6	No inhibition of histamine secretion
KFGF	Gai <sub>3</sub>	SEQ ID NO: 7	Inhibited histamine secretion
Dros	Gai <sub>3</sub>	SEQ ID NO: 10	Induced histamine

			secretion
Hu Int	Gat	SEQ ID NO: 11	No inhibition of histamine secretion
KFGF SEQ ID NO: 3	Gat	SEQ ID NO: 12	Inhibited histamine secretion
Dros	Gat	SEQ ID NO: 13	Induced histamine secretion
TP-10	Gαi <sub>3</sub>	Jones <i>et al.</i>	No inhibition of beta-hexoseaminidase secretion

8. From this data, it is clear that only Lin's CCP, KFGF is able to both deliver mast cell activation inhibitors and maintain their biological activity as inhibitors of mast cell activation. The Examiner says that this is predictable from the literature. I respectfully disagree.

Lin discloses that KFGF sequence transported two biologically active cargo peptides and generally states that KFGF can be used to transport other peptides. But similar reports exist for each of the other CCPs tested by applicants. The Hawiger review article discloses that the CCP designated integrin β<sub>3</sub> is just as able as KFGF to transport functional peptides into a cell (see page 189, 2nd column). Finally Derossi *et al.* describes the *Drosophila* CCP as successfully delivering biologically active compounds inside live cells (page 18188, 2nd col).

From page 7 of the Office Action, the Examiner appears to interpret this literature as leading one of skill to believe that there is a reasonable expectation that any

combination of CCP with any biologically active peptide will lead to the observation of biological activity in a cell.

I respectfully disagree. There are several scientific and objective reasons why fusing a CCP to a biologically active peptide might not result in observation of expected biological activity. These reasons include improper folding of the fusion peptide resulting in conformational changes that render the cargo peptide inactive; the degradation of the foreign peptide; sequestering of the peptide in endosomes or the ability of the CCP sequence to trigger a biological response, such as mast cell degranulation (e.g. positively charged CCP might function as basic secretagogues of mast cells).

Indeed, this appears to be the case for fusion of CCP with either  $G_{\alpha i_3}$  or  $G_{\alpha t}$ . The data from applicants' laboratory and from the Jones *et al.* group demonstrate that not any CCP can maintain the biological activity of  $G_{\alpha i_3}$  or  $G_{\alpha t}$ . Of four CCPs, only KFGF was the only CCP able to both internalize and maintain the inhibitory activity of both  $G_{\alpha i_3}$  and  $G_{\alpha t}$ . Thus the combination provides a surprisingly advantageous result that was not predictable from the prior art.

I do note the Examiner's statement on page 7 that the table on page 9 with reference to the prior literature describing the various CCPs fail to demonstrate that Lin's CCP is unpredictable as a delivery tool. While this is true, there was no academic reason *a priori* to believe that any of the other CCPs would fail to deliver  $G_{\alpha i_3}$  and  $G_{\alpha t}$  while maintaining its expected biological activity. But the evidence established by the record indicates that this is not true. There is obviously something special about the two mast cell activation inhibitors or with Lin's CCP that makes the claimed combination functional compared to the other three CCPs.

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For these reasons, I conclude without hesitation that the claimed combinations of AAVALLPAVLLALLAP with either G $\alpha$ i<sub>3</sub> or G $\alpha$ t to yield a functional inhibitory effect on mast cell activation in light of failure with three other CCPs of equal status was unpredictable, surprising and of great value.

This Declarant has nothing further to say.

Dated: May 6 2007

Dr. Ehud Razin Ehud Razin

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## CURRICULUM VITAE

Name: Ehud Razin  
Birthdate: July 14, 1947  
Marital Status: Married (Michal), two children: Ayelet (1979),  
Jonatan (1986).  
Title: Professor of Biochemistry, Hebrew-University,  
Hadassah Medical School.  
Dr. Marcus Rabwin Chair in Cancer Research

Research Interests: Biology of Mast Cells

### EDUCATION:

1965 - 1968 Captain, Israeli Army  
1970 - 1973 B. Sc. Biology - Hebrew University of Jerusalem  
1973 - 1975 M. Sc. Microbiology - Hebrew University of  
Jerusalem  
1976 - 1980 Ph.D. Immunology - Weizmann Institute of Science

### PROFESSIONAL EXPERIENCE:

2005- Dean Faculty of Medicine Hebrew University  
2001-2005 Chairman of the Faculty's Planning &  
Development Committee  
1998-2001 Chairman Biochemistry Department  
1996- Professor of Biochemistry  
1997-8 Visiting Scientist of NIAMS, NIH  
1993 July-December Visiting Scientist, NIH, U.S.A.  
  
1991-1996 Assoc. Professor in Biochemistry, Hebrew University  
of Jerusalem  
1987 - 1991 Senior Lecturer in Biochemistry, Hebrew University of  
Jerusalem.  
1983 - 1987 Lecturer in Biochemistry, Hebrew University of  
Jerusalem.  
1982 - 1984 Research Fellow - Immunopharmacology, Harvard  
Medical School, Boston, MA, USA.  
1980 - 1981 Research Fellow - Immunology, Memorial Sloan-  
Kettering Cancer Centre, NY, USA.  
1989 - 1990 Visiting Professor, Biomedical Research Centre, UBC,  
Vancouver, Canada.  
1987 - 1989 Consultant, Syntex Research Co., Palo Alto, CA, USA

### AWARDS:

1979 DAAD Scholarship  
1980 Chaim Weizmann Fellowship

### SOCIETIES:

1983 American Association of Immunologists

1994 CoLLEGIUM INTERNATIoNALE  
ALLERGoLoGICUM (CIA).  
1998 American Society for Biochemistry and Molecular  
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## **Ehud Razin:**

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\* Faculty of 1000

\*\* Faculty of 1000 top 10 percent.

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Appl. No. 10/009,809

Atty. Docket No. 026549-000100US PATENT

**11. RELATED PROCEEDINGS APPENDIX**

None